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(54) Electrical connectors

(57) An electrical connector for establishing a connection between a wire and a pipe (35) comprises a flexible strap (31) surrounding the pipe and a clamp member for securing and tightening the strap to the pipe. The clamp member comprises a saddle member (11) and a terminal member (21) part of which is located within the saddle and part (not shown) of which incorporates a terminal for receiving the wire. The strap passes through apertures (19, 20) in legs of the bridge piece and one end of the strap incorporates formations which resist inadvertent removal of the strap from the saddle member in both axial directions of the strap. A clamp screw (15) in the saddle member tightens the strap and clamps the terminal member to the pipe.

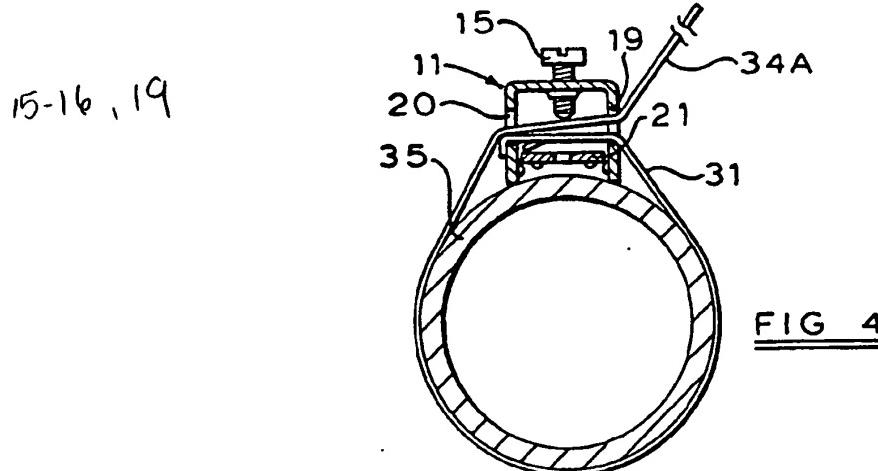
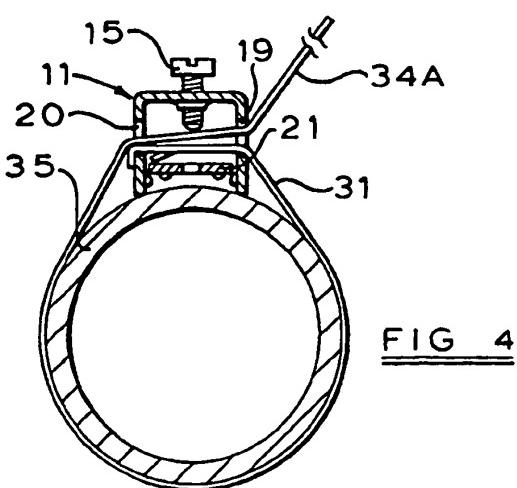
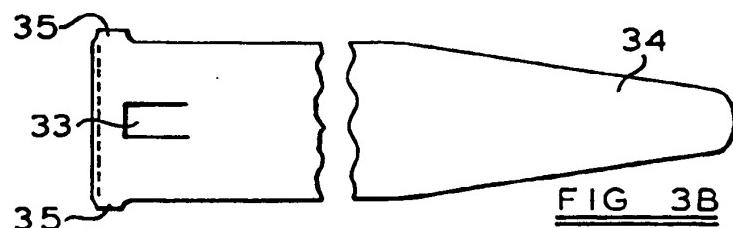
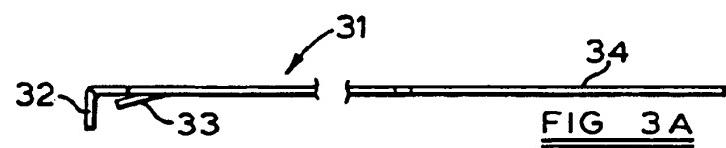
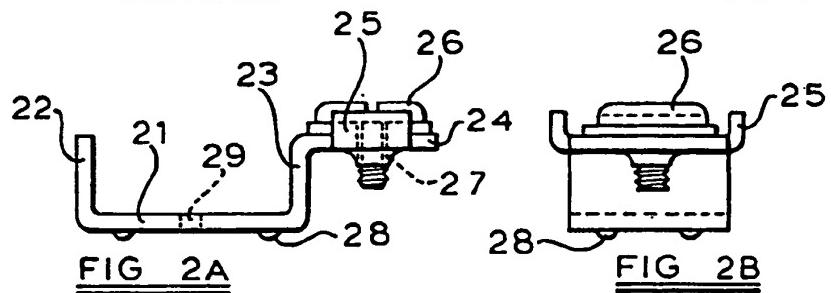
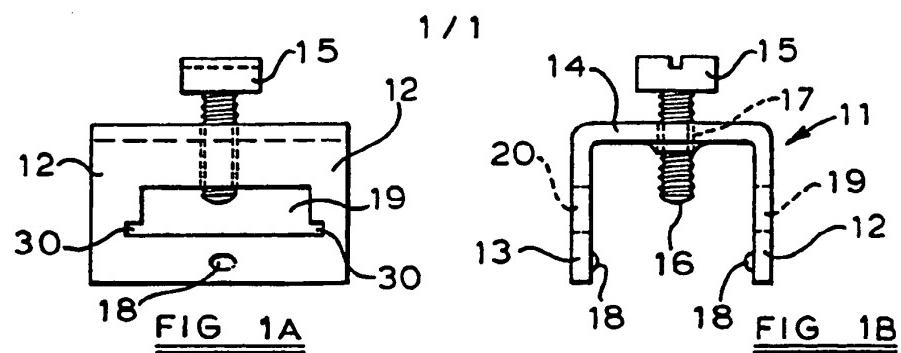


FIG 4

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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ELECTRICAL CONNECTORS

The invention related to electrical connectors for establishing a connection between a wire and a pipe. These connectors are normally used for connecting earth wires to water pipes or gas pipes as parts of mains electrical wiring installations in buildings.

There is a well established and broadly standardised design of earth clamp and the present invention is based on this design but incorporates small but significant improvements. The nature of the modifications from the standard design will be emphasized in the following detailed description with reference to the drawings.

According to the present invention an electrical connector for establishing connection between a wire and a pipe comprises a flexible strap adapted to surround the wire and a clamp member for securing and tightening the strap around the pipe, the clamp member comprising:
a saddle member having two legs for engagement with the pipe and joined by a bridge piece remote from the pipe with apertures in the legs for receiving the strap;
a terminal member having a part lying between the two legs for engagement between the strap and the pipe and having a terminal for receiving the wire;

and a clamp screw mounted in the bridge piece for urging the strap and terminal member towards the pipe to provide a clamping action;

characterised in that the strap incorporates formations at
05 one end portion thereof adapted to co-operate with the saddle member and to resist removal of the strap from the saddle member in both axial directions of the strap.

Preferably one formation is a tag, partially cut from the strap and engaged between the legs against one of the legs.

10 Another formation may be in the form of a bent over end portion of the strap for engagement against an outer face of a leg.

The straps and the apertures in the legs preferably have co-operating elements to hold said one end portion of the strap at the sides of the apertures adjacent to the pipe to cause said formations of the strap to engage with the saddle member. The strap may have laterally extending lugs at said one end portion and one of the apertures then has corresponding recesses for engagement by the lugs.

20 An embodiment of the invention will now be described with reference to the accompanying drawings in which:-

Figures 1A and 1B are side and end views respectively of a saddle member and clamp screw of a connector according to

the invention;

Figures 2A and 2B are corresponding views of a terminal member of the electrical connector;

Figures 3A and 3B are side and plan views of a strap of the
05 electrical connector; and

Figure 4 is a cross section view of a complete electrical connector incorporating the components of Figures 2 to 3 installed around a pipe and about to be clamped thereto.

Figure 1 shows a saddle member 11 having two legs 12 and 13 joined together by a bridge piece 14. A clamp screw 15 having a rounded nose 16 is screwed into a pierced and threaded aperture 17 at the centre of the bridge piece. Each leg has a small pressed out projection 18 which is an aid to assembly of the connector as will be described
15 subsequently.

Each leg 12 and 13 incorporates an aperture 19, 20. In a conventional earth clamp these apertures are simply rectangular. In this example, they each have small laterally extending recesses 30 in the corners intended in
20 use to be nearest to a pipe for a purpose to be described subsequently.

- Figures 2A and 2B show a terminal member which is another part of the electrical connector and intended for use with the saddle member of Figure 1. The terminal member is also a steel pressing. It incorporates a base 21 intended in 05 use to engage against a pipe. Upward extensions 22 and 23 at both ends of the base are intended to engage loosely in the interior of the saddle member near its ends to assist in location of the terminal member with respect to the saddle member.
- 10 Extension 23 also carries an outwardly directed terminal 24 which incorporates wings 25 and a terminal screw 26 screwed into a pierced and threaded hole 27 in the terminal. In use an earth wire is clamped under the head of screw 26, the wings 25 helping to prevent undesired spread of the 15 wire away from the clamping position. The base 21 has four small projections 28 which help it to seat on a pipe as will be explained subsequently. A central hole 29 in the base is in the assembled connector in line with the screw 15 shown in Figure 1.
- 20 The strap shown in Figures 3A and 3B is intended for use with the saddle member of Figure 1 and the terminal member of Figure 2 and these components together provide a complete electrical connector. The strap 31 is formed from flexible steel strip. Its left hand end is intended for 25 initial engagement in the saddle member 11 of the Figure 1.

- This left hand end incorporates various formations intended to assist location of the strap in the saddle member. These formations are a bent down end 32 and a tab 33, partially cut from the strip and bent downward. A 05 formation such as 32 is conventional whereas formation 33 is a departure from normal design. This end portion of the strap also incorporates two laterally extending lugs 35. These lugs are swaged out from the strip material forming the strap.
- 10 The end portion 34 of the strap remote from the formations 32 and 33 is tapered.

Figure 4 is a cross section through a fully assembled electrical connector used as an earth clamp in connection with a pipe 35. Full details of all parts of the connector 15 are not shown in Figure 4 but it does show the assembly. Individual details of components are shown in Figures 1 to 3. At the manufacturing stage of the electrical connector, the saddle member and terminal member are assembled together as shown in Figure 4. The base 21 of the terminal 20 member is held between legs 12 and 13 by the projections 18 and parts 22 and 23 (Figure 2) of the terminal member engage between the legs 12 and 13 and under the bridge piece 14. The strap in the manufactured condition of the connector is straight and has its left hand end (as shown 25 in Figure 3) engaged through the apertures 19 and 20.

Formation 32 engages the outer face of leg 20 and tab 33 engages the inner face of the same leg, thereby positively holding the strap in position. Lugs 35 engage in recesses 30 in one aperture 20 so that the lugs and recesses act as co-operating elements to hold the strap down towards the bottom of the aperture that is the side adjacent the pipe, so that the formation 32 and tab 33 are effective to hold the strap in position. Tab 33 is sufficiently resilient to allow it to be deflected as the lugs are inserted in their recesses. The additional recesses 30 are provided for purposes of symmetry, but additional lugs could be provided to co-operate with them.

For establishing the connection to the pipe 35 the saddle member is positioned as shown against the pipe and the strap 31 is bent around the pipe and has its tapered end 34 threaded through the apertures 20 and 19 respectively. For this stage, clamp screw 15 is raised up sufficiently to allow free access of the strap through the apertures. Having the strap held positively in the saddle by formations 32 and 33 greatly facilitates the installation of the connector.

A connector which is easy to install is particularly important because very often it has to be attached to a pipe in an inaccessible position. Possibly the operative will not be able to see the pipe and connector while it is

being installed and/or possibly he will only be able to reach it with one hand. Effective installation of such a connector is vital to the safety of electrical installation so any aid to simplifying installation is of very
05 substantial value. Once the strap has been installed as described and pulled tight by direct manual tension on its end 34, it may be held against developing significant slack by bending the end over as illustrated at 34A. To complete an effective clamping of the connector to the pipe, screw
10 15 is tightened. The tightening of this screw deflects both parts of the strap between the legs 12 and 13 thus further tightening it. It also clamps the base 21 of the terminal member against the pipe, effective seating of and electrical connection to the terminal member being assisted
15 by the projections 28. The rounded nose 16 of clamp screw 15 allows some movement of the strap through the apertures 19 and 20 to prevent over tightening and piercing of the strap. At the final stage of clamping, the strap is held tightly between clamp screw 15 and the corners of aperture
20 29 in the terminal member.

In a conventional way, all components of the electrical connector are plated or otherwise surface treated to facilitate provision of effective electrical connections and to resist corrosion which would disrupt such
25 connections. The pipe 35 should also receive appropriate attention to ensure an effective electrical connection.

Once the electrical connector has been installed on the pipe 35, an earth wire may be connected in a conventional way to terminal 24, being clamped in position by screw 25.